



# **Armed Forces College of Medicine**

## **AFCM**



# **Front of Forearm**

**By**

## **Prof Mervat Thabet**

# INTENDED LEARNING OBJECTIVES (ILO)



**By the end of this lecture, the student will be able to:**

1. **Describe** the attachment, action and nerve supply of muscles of the front of forearm (superficial and deep)
2. **Describe** the course, relations and branches of ulnar and median nerves in the forearm
3. **Describe** the course , termination and branches of radial and ulnar arteries in the forearm

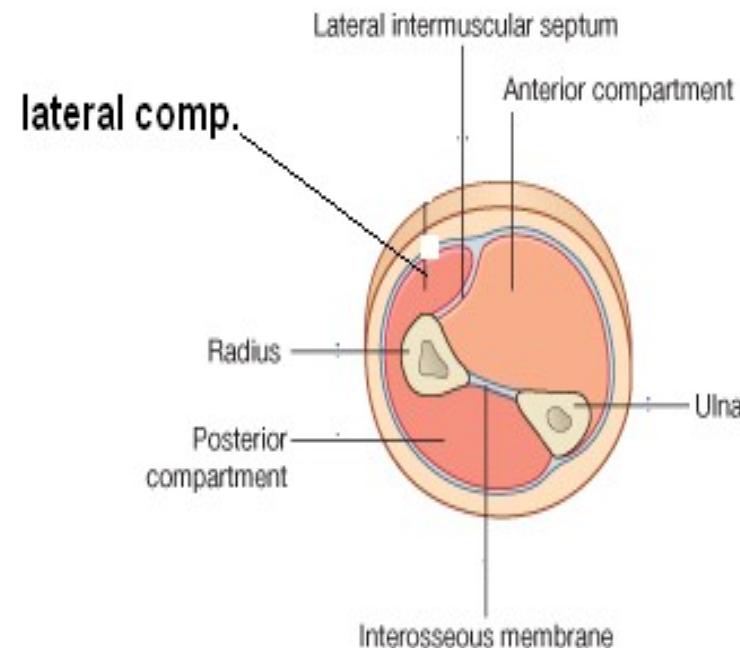
# KEY POINTS OF THE LECTURE



1. Action and nerve supply of muscles of the front of forearm (superficial and deep)
2. Course, relations and branches of ulnar and median nerves in the forearm
3. Origin, course , termination and branches of radial and ulnar arteries in the forearm

## Fascial Compartments of the Forearm:

- The forearm is enclosed within a sheath of deep fascia, which is attached to the posterior subcutaneous border of the ulna.
- This fascial sheath, together with the interosseous membrane, fibrous intermuscular septa, radius and ulna divide the forearm into two compartments; anterior and posterior compartments; each having its own muscles, nerves, and blood supply



## **CONTENTS OF ANTERIOR FASCIAL COMPARTMENT:**

### **1- MUSCLES:**

- Superficial group: of 5 muscles.**
- Deep group: of 3 muscles.**

### **2- Blood supply to muscles:**

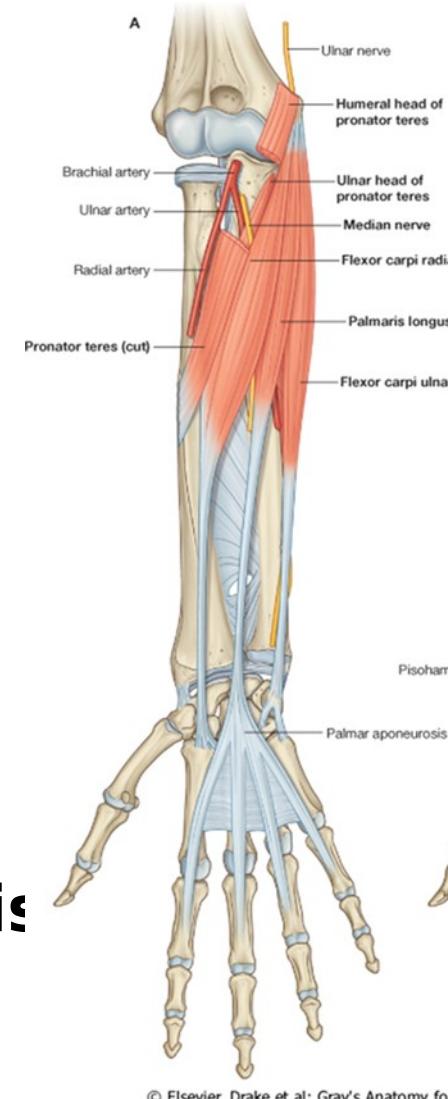
**Ulnar and radial arteries.**

### **3- Nerve supply to muscles:**

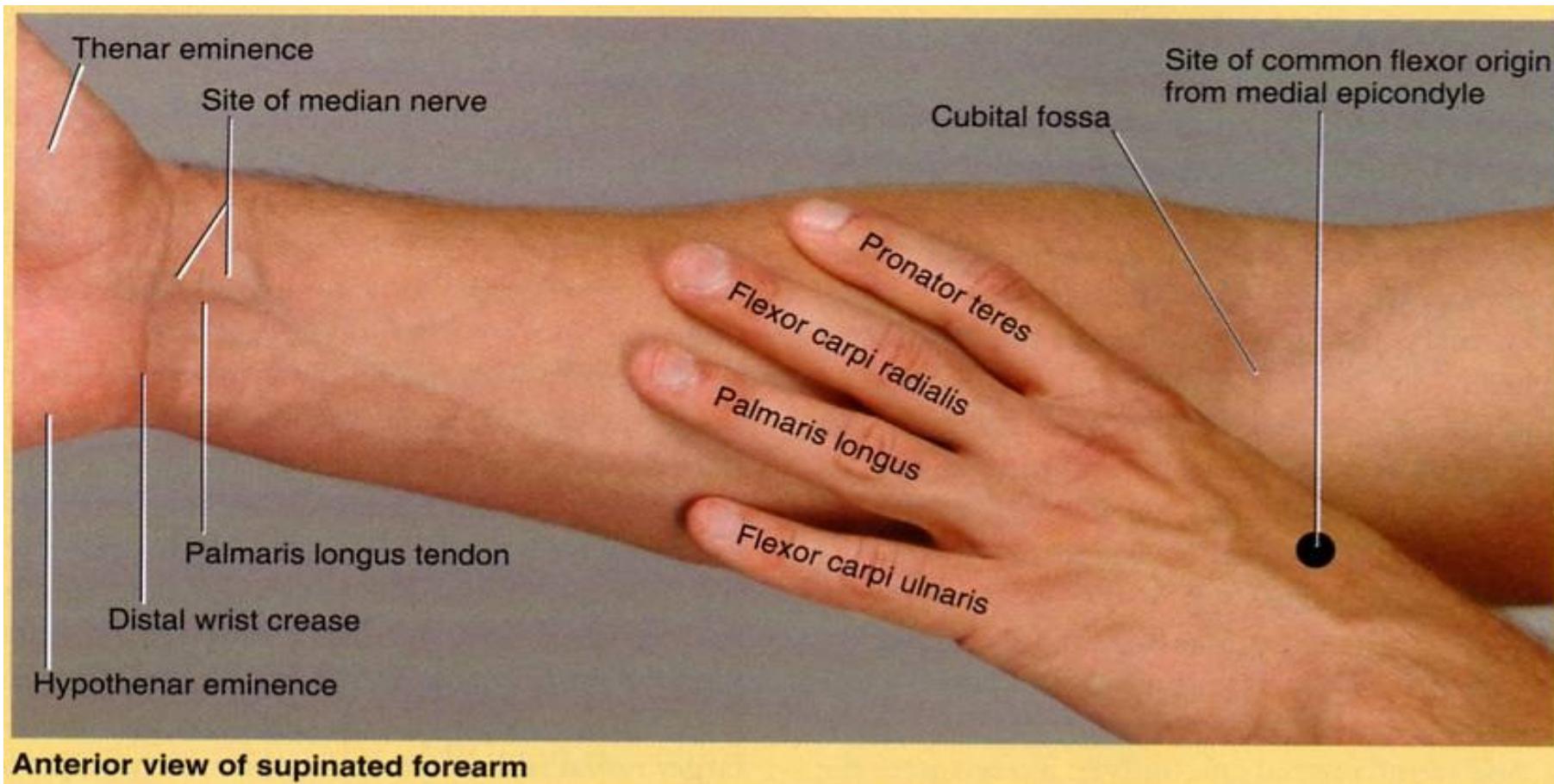
**Branches from median and ulnar , nerves.**

## MUSCLES OF THE ANTERIOR COMPARTMENT OF FOREARM:

- **They are 2 groups:**
- **Superficial group : 5 in number from lateral to medial**
  - 1- pronator teres.(short)**
  - 2- flexor carpi radialis.**
  - 3- palmaris longus (may be absent)**
  - 4- flexor carpi ulnaris.**
  - 5- flexor digitorum superficialis (at a deeper plane).**

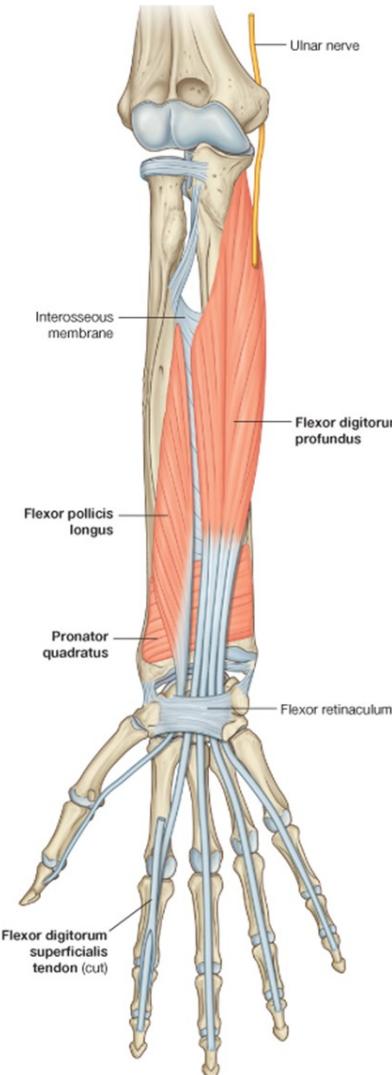


© Elsevier. Drake et al: Gray's Anatomy for Students - www.studentconsult.com



**Deep group:** of 3 muscles.

- 1- Flexor pollicis longus.
- 2- Flexor digitorum profundus.
- 3- Pronator quadratus.  
(short)



© Elsevier. Drake et al: Gray's Anatomy for Students - www.studentconsult.com

## All the superficial group have the following characters:

1- All of them take origin from front of medial epicondyle( common flexor origin) (i.e. from lower end of humerus).

Some have additional origin.

2- All are inserted in the hand except pronator teres in the radius.

3- All are supplied by median nerve except flexor carpi ulnaris by ulnar nerve.

4- All help in flexion of elbow.

5- All help in flexion of wrist except pronator teres.

## Pronator teres -1

### Origin-

**humeral head :Medial - supracondylar ridge and common flexor origin (CFO)**

**ulnar head: coronoid process of - .ulna**

### Insertion

**Radius (middle of lateral surface)**

### Action

**Flexion elbow -  
.pronation -**



## flexor carpi radialis -2

### Origin-

**common flexor origin -**

### Insertion

**Base of 2<sup>nd</sup> , 3<sup>rd</sup> metacarpal  
.bones**

### Action

**Flexion elbow -**

**.Flexion wrist -**

**.Abduction hand -**



## palmaris longus -3

### Origin-

**common flexor origin -**

### Insertion

**Palmar aponeurosis**

### Action

**.Flexion elbow -**

**.Flexion wrist -**



## flexor carpi ulnaris -4

### Origin-

**Humeral head: common -  
flexor origin**

**ulnar head: olecranon -  
process and posterior border  
of ulna**

### Insertion

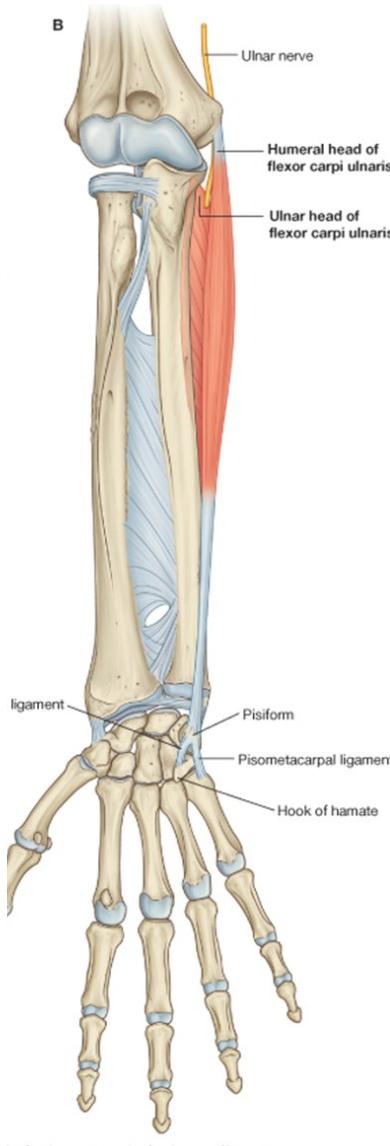
**Pisiform bone and base of 5<sup>th</sup>  
metacarpal bone and hook of  
hamate**

### Action

**Flexion elbow -**

**.Flexion wrist -**

**.Adduction hand -**



tudents - [www.studentconsult.com](http://www.studentconsult.com)

Action	Insertion	Origin	Muscle
<b>Flexion - elbow</b> <b>.pronation -</b>	<b>Radius (middle of lateral surface)</b>	<b>Medial - epicondyle .(humeral head)</b> <b>coronoid- process of ulna(ulnar .head)</b>	<b>-1</b> <b>Pronator teres</b>
<b>Flexion - .elbow</b> <b>Flexion - .wrist</b> <b>Abduction - .hand</b>	<b>Base of 2<sup>nd</sup> , 3<sup>rd</sup> metacarpal .bones</b>	<b>Medial - epicondyle</b>	<b>flexor -2 carpi radialis</b>
<b>Flexion - .elbow</b> <b>Flexion - .wrist</b>	<b>Palmar aponeurosis</b>	<b>Medial - epicondyle</b>	<b>-3</b> <b>palmaris longus</b>
<b>Flexion -</b>	<b>Pisiform</b>	<b>Medial -</b>	<b>flexor -4</b>

## Flexor digitorum-5 superficialis

### Origin

**humeroulnar head : CFO and - coronoid process ( as pronator teres)**

**radial head: anterior oblique - line of radius**

### Insertion

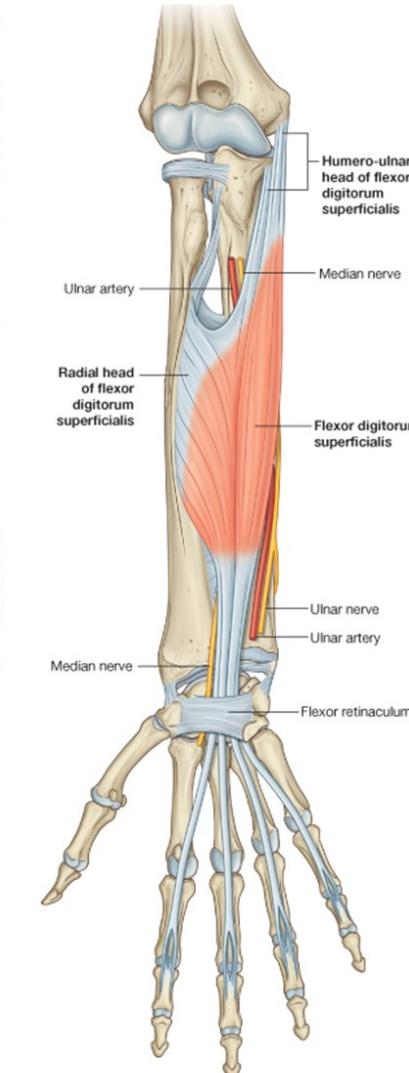
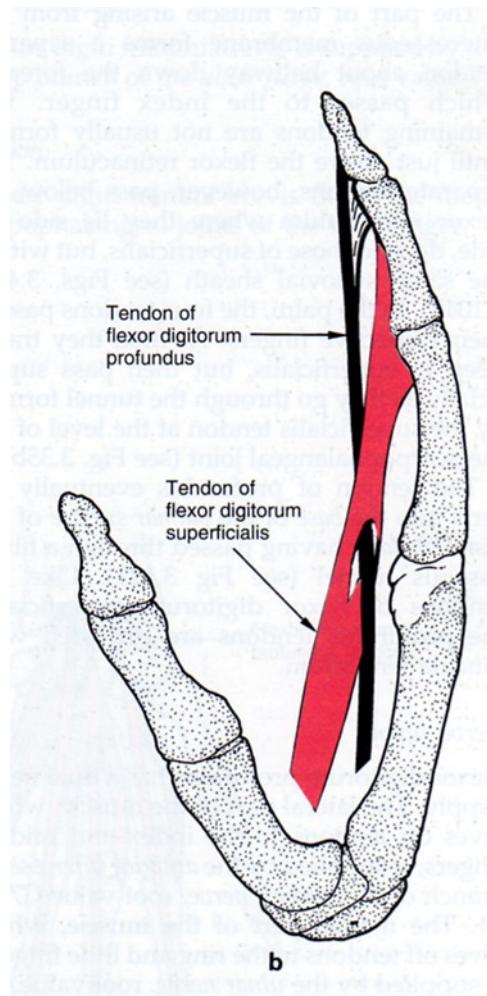
**By 4 tendons into the middle .phalanges of medial 4 fingers**

### Action

**.Flexion elbow -**

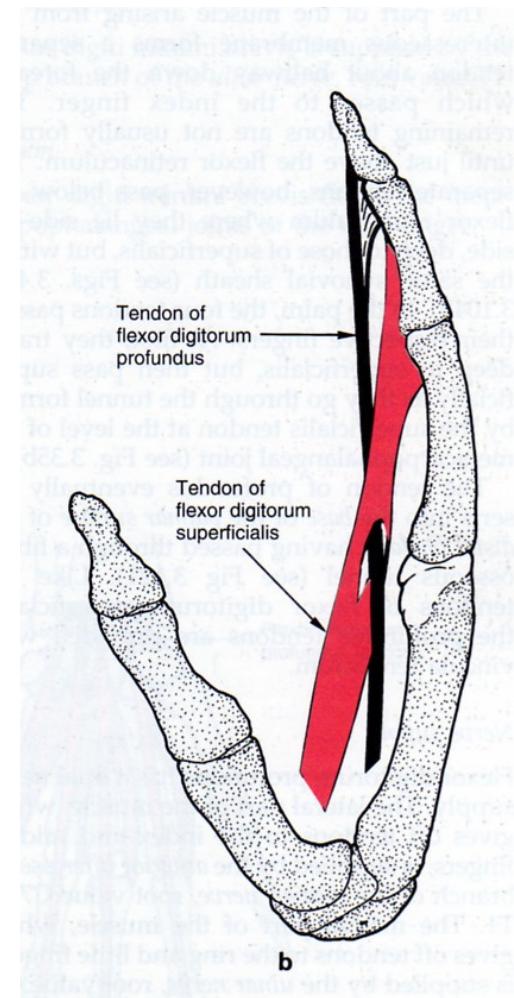
**.Flexion wrist -**

**Flexion of proximal and - middle phalanges of medial 4 .fingers**



© Elsevier. Drake et al: Gray's Anatomy for Students - www.studentconsult.com

action	insertion	origin	Muscle
<b>Flexion -</b> <b>.elbow</b> <b>Flexion -</b> <b>.wrist</b> <b>Flexion of -</b> <b>proximal</b> <b>and middle</b> <b>phalanges</b> <b>of medial</b> <b>.4 fingers</b>	<b>By 4 -</b> <b>tendons</b> <b>into the</b> <b>middle</b> <b>phalanges</b> <b>of medial 4</b> <b>.fingers</b>	<b>Medial -</b> <b>.epicondyle</b> <b>. Ulna -</b> <b>.radius -</b> <b>humeroul )</b> <b>nar head</b> <b>and radial</b> <b>(head</b>	<b>Flexor-5</b> <b>digitorum</b> <b>superficial</b> <b>is</b>



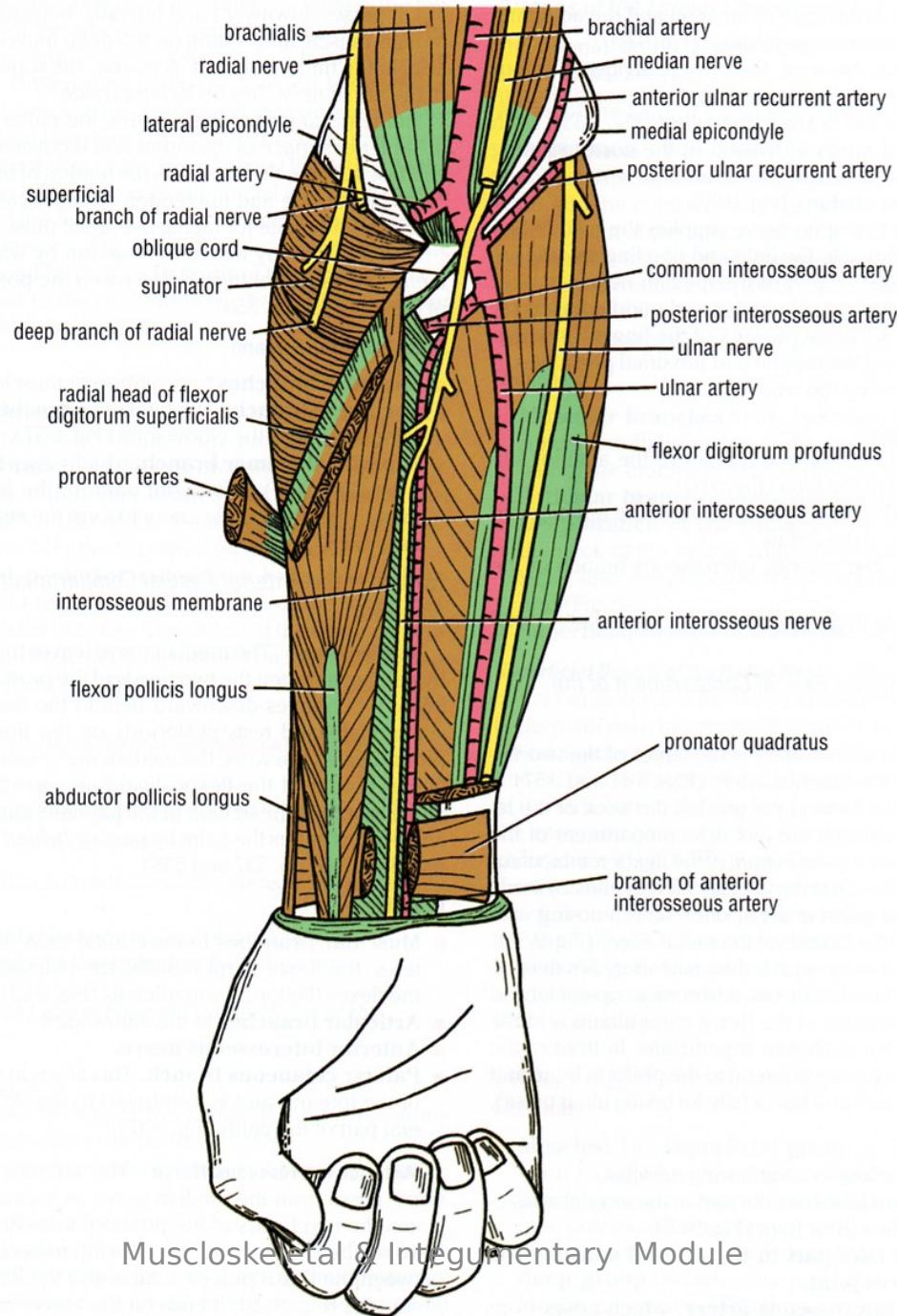
## **B- Deep muscles:**

**They are 3 in number**

- 1- Flexor pollicis longus.**
- 2- Flexor digitorum profundus.**
- 3- Pronator quadratus.**

All the deep muscles have the following characters:

- 1- All take origin from radius or ulna only.**
- 2- All inserted in hand except pronator quadratus in radius.**
- 3- All supplied by anterior interosseous nerve (branch from median) except medial  $\frac{1}{2}$  of flexor digitorum profundus by ulnar nerve.**



## **:Deep group**

### **.Flexor pollicis longus -1**

#### **Origin**

**Anterior surface of radius and-  
membrane**

**Coronoid process-**

#### **Insertion**

Base of terminal phalanx of  
.thumb

#### **Action**

.Flexion wrist -

.Flex all joints of thumb -



## Flexor digitorum -2 .profundus :Origin

**Anterior surface of ulna-  
and membrane**  
**Posterior border of ulna-**

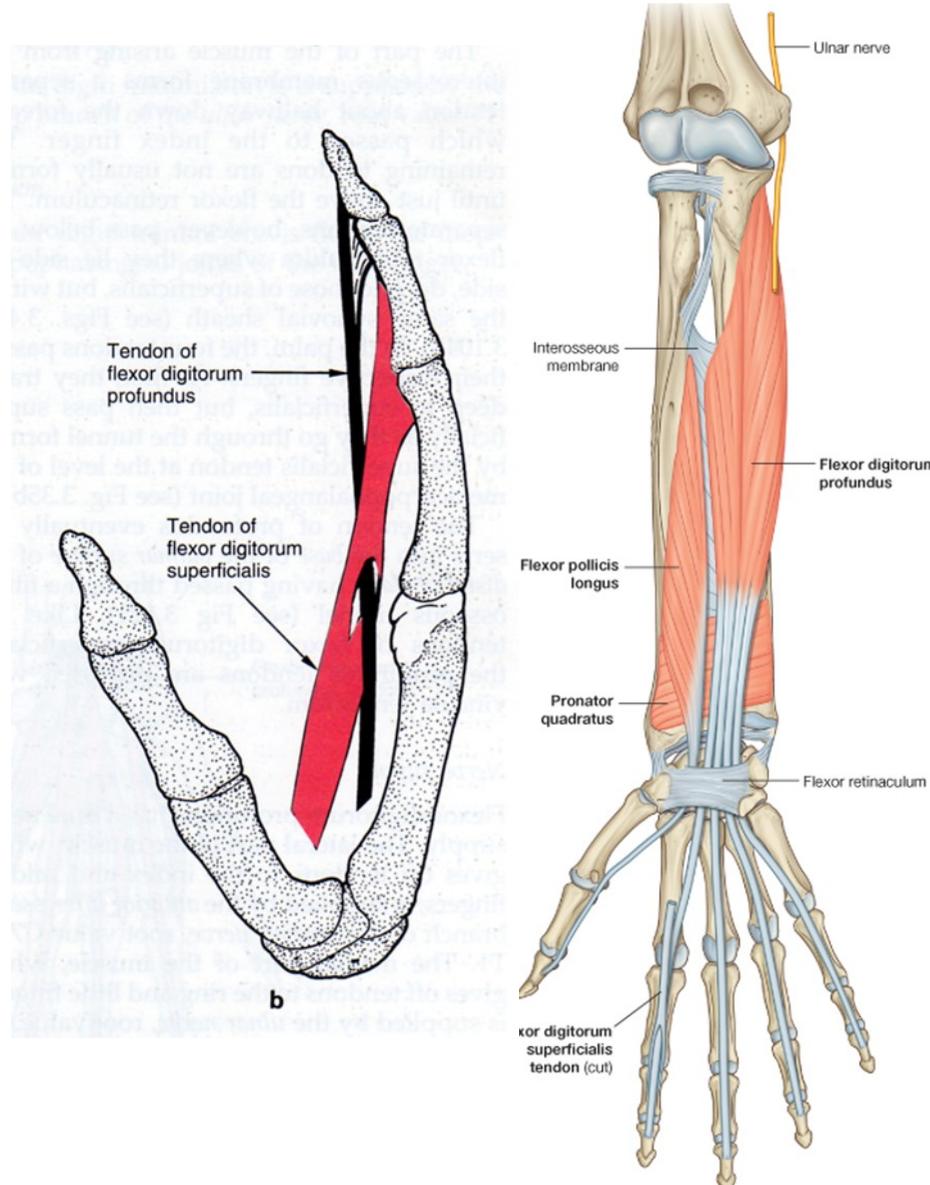
### Insertion

Base of terminal phalanges of  
.medial 4 fingers

### Action

.Flex wrist -

Flex all joints of medial 4 -  
.fingers



## Pronator quadratus -3

### :Origin

**Lower part of shaft of ulna(oblique ridge)**

### Insertion

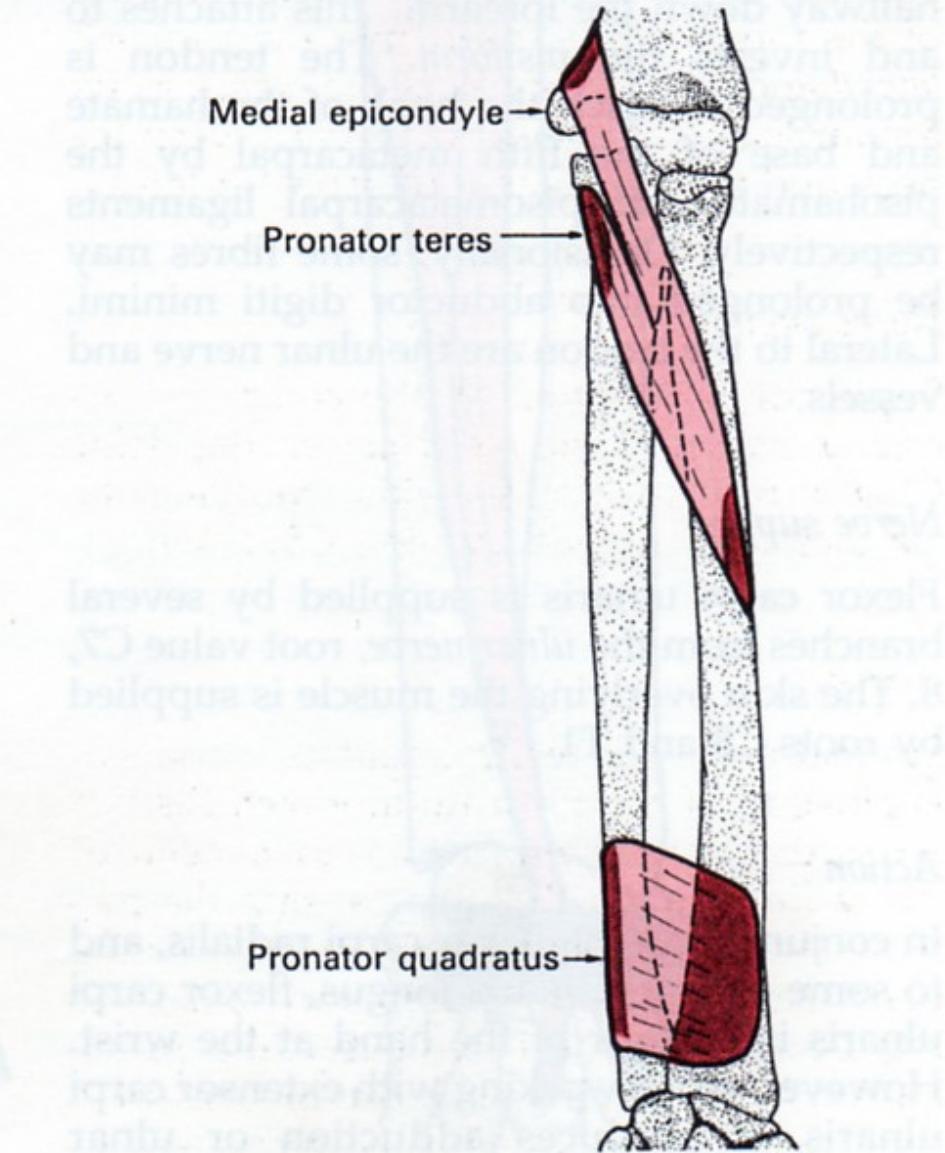
**Lower part of anterior surface of shaft of radius**

### Action

**Pronation -**



<b>C</b>	<b>Insertion</b>	<b>Origin</b>	<b>Muscle</b>
.Flexion wrist - .Flex all joints of thumb -	Terminal phalanx of .thumb	Radius	<b>Flexor -1 pollicis .longus</b>
.Flex wrist - Flex all joints of medial - .4 fingers	Terminal phalanges of medial 4 .fingers	Ulna	<b>Flexor -2 digitorum .profundus</b>
.Pronation	.Radius	Ulna	<b>Pronator -3 .quadratus</b>



**Fig. 3.31** The attachments (shaded) of pronator teres and pronator quadratus of the left arm, anterior view.

Musculoskeletal & Integumentary Module

## **All the muscles of superficial group have the following characters:**

**1- All of them take origin from front of medial epicondyle( common flexor origin).**

**Some have additional origin.**

**2- All are inserted in the hand except pronator teres in the radius.**

**3- All are supplied by median nerve except flexor carpi ulnaris by ulnar nerve.**

**4- All help in flexion of elbow.**

**5- All help in flexion of wrist except pronator teres.**

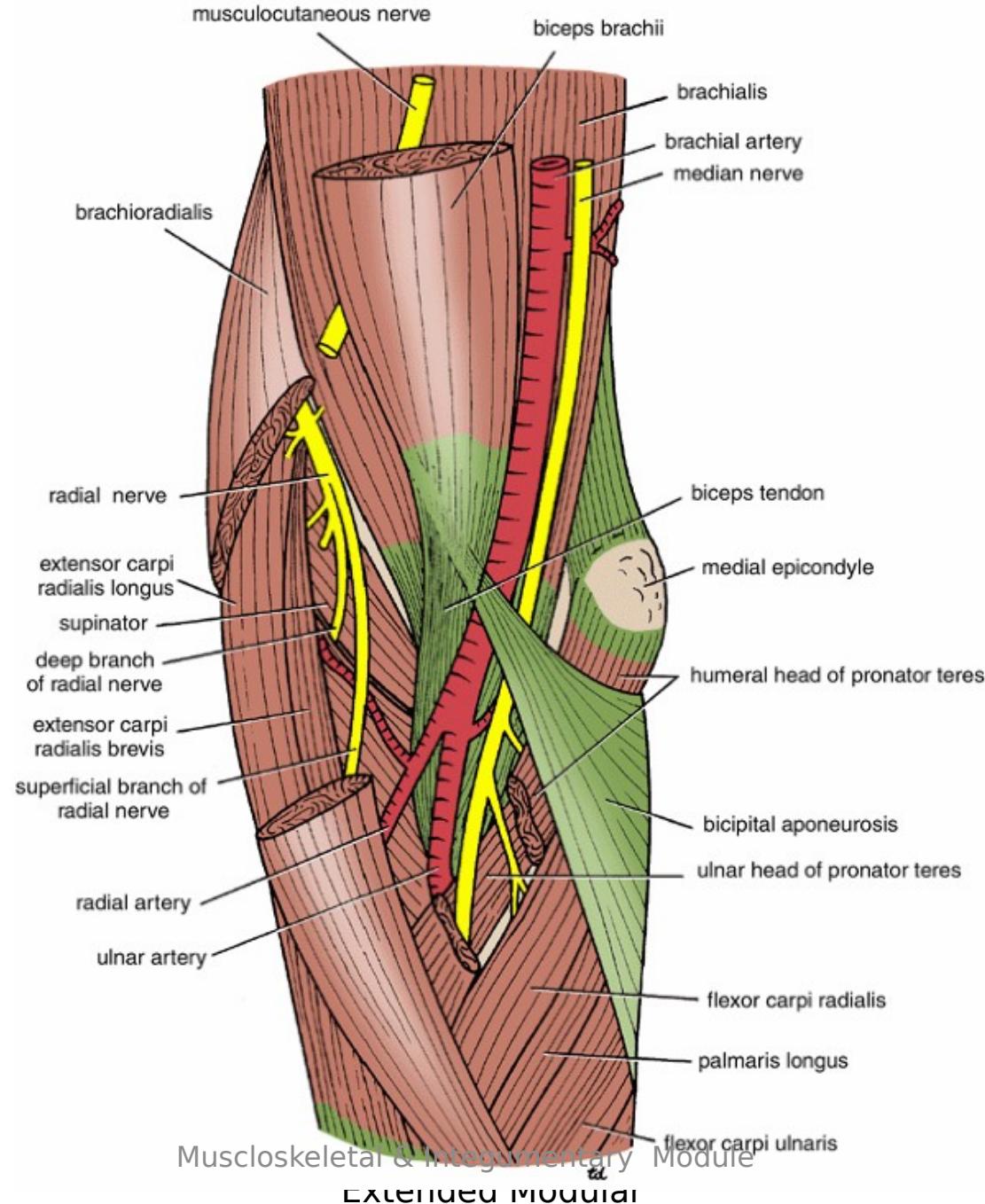
## **B- Deep muscles:**

**They are 3 in number**

- 1- Flexor pollicis longus.**
- 2- Flexor digitorum profundus.**
- 3- Pronator quadratus.**

**All the deep muscles have the following characters:**

- 1- All take origin from radius or ulna only.**
- 2- All inserted in hand except pronator quadratus in radius.**
- 3- All supplied by anterior interosseous nerve (branch from median) except medial  $\frac{1}{2}$  of flexor digitorum profundus by ulnar nerve.**



# The Cubital Fossa

A triangular depression that lies in front of the elbow.

## Boundaries:

- Laterally: Brachioradialis muscle

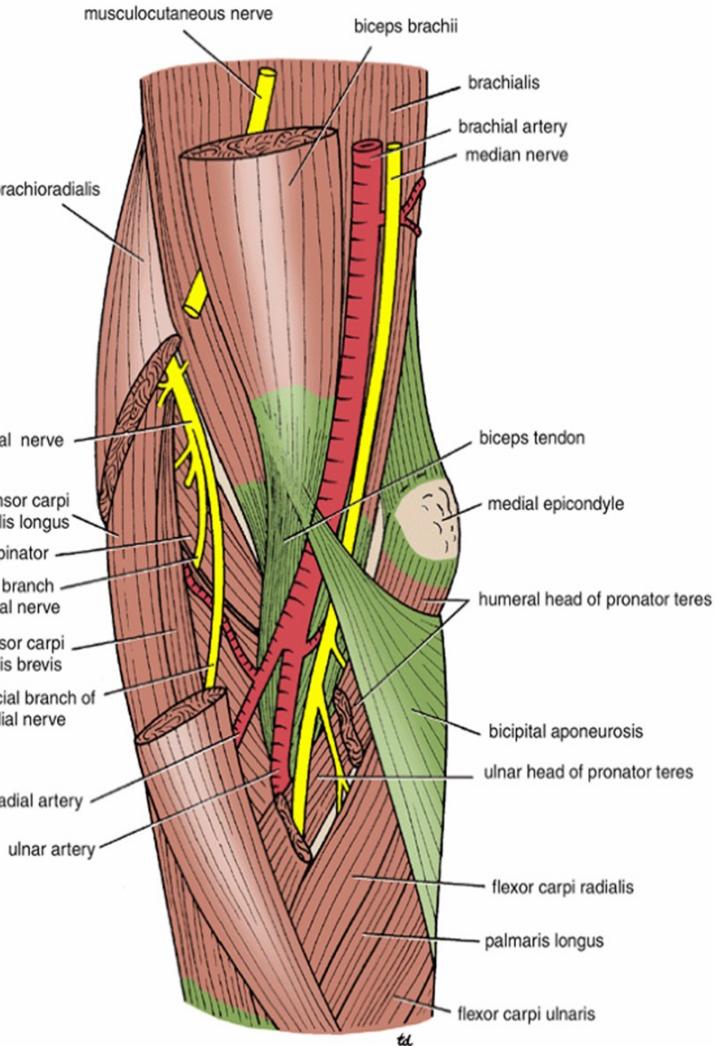
- Medially:

Pronator teres muscle

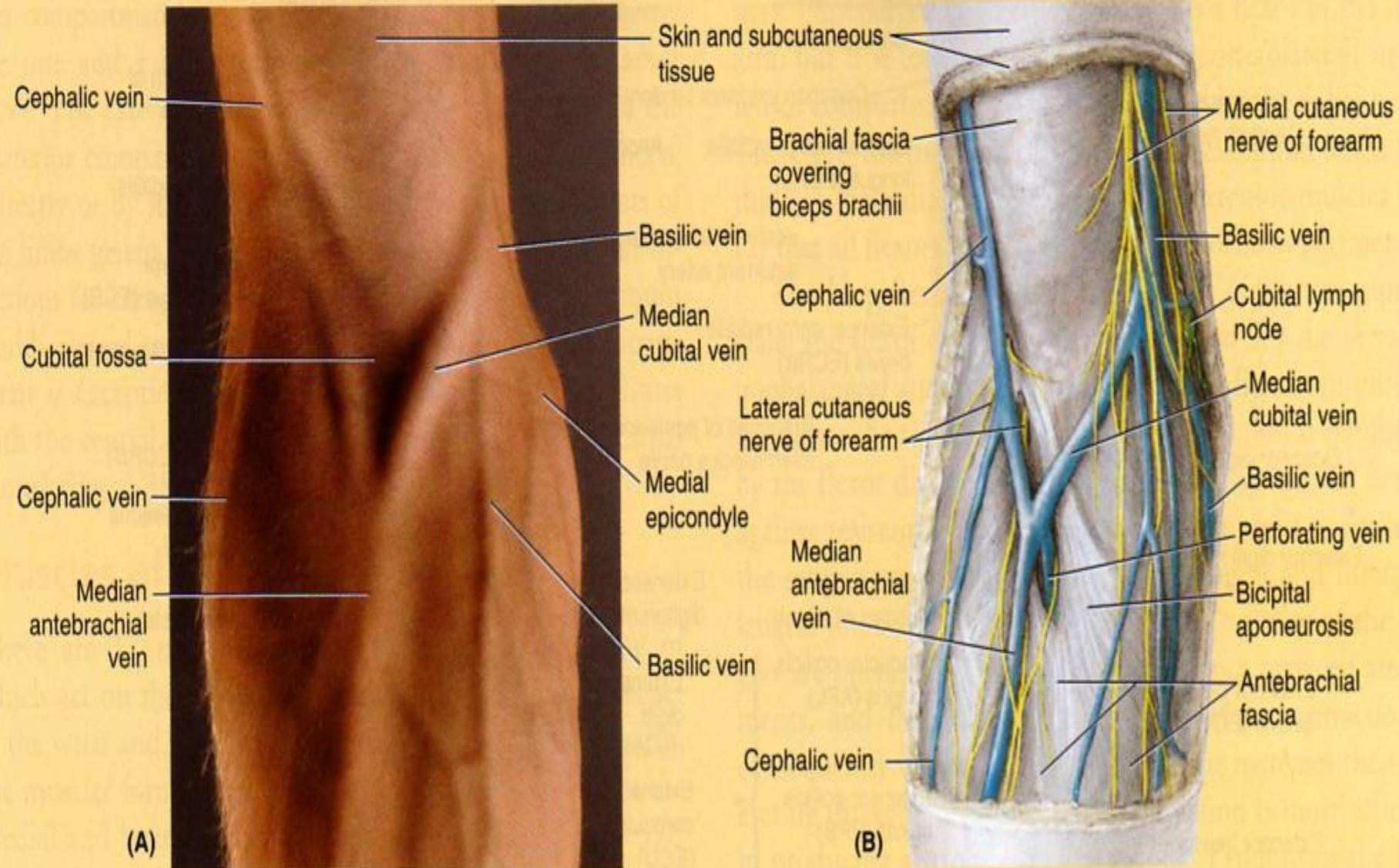
-The base: An imaginary line between the two epicondyles of the humerus.

-The floor: Supinator muscle laterally and the brachialis muscle medially

-The roof: Skin and fasciae and is reinforced by the bicipital aponeurosis



It contains median cubital



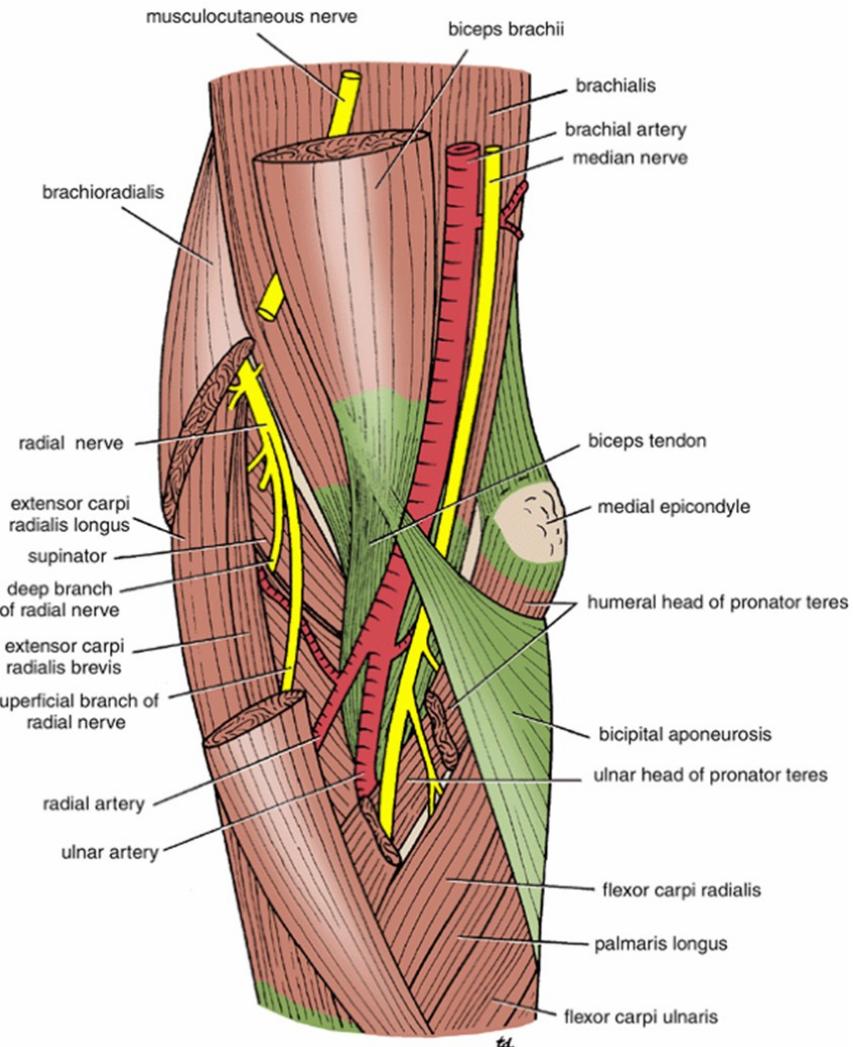
Anterior views

**Figure SA6.11**   
Musculoskeletal & Integumentary Module

# Contents of the cubital fossa

**The cubital fossa contains the following structures from the medial to the lateral side:**

- Median nerve
- Bifurcation of the brachial artery into the ulnar and radial arteries
  - Tendon of the biceps muscle
  - Radial nerve and its deep branch



# The supratrochlear lymph node lies in the superficial fascia over the upper part of



**Which one of the following nerves enters the forearm between the two heads of pronator teres?**

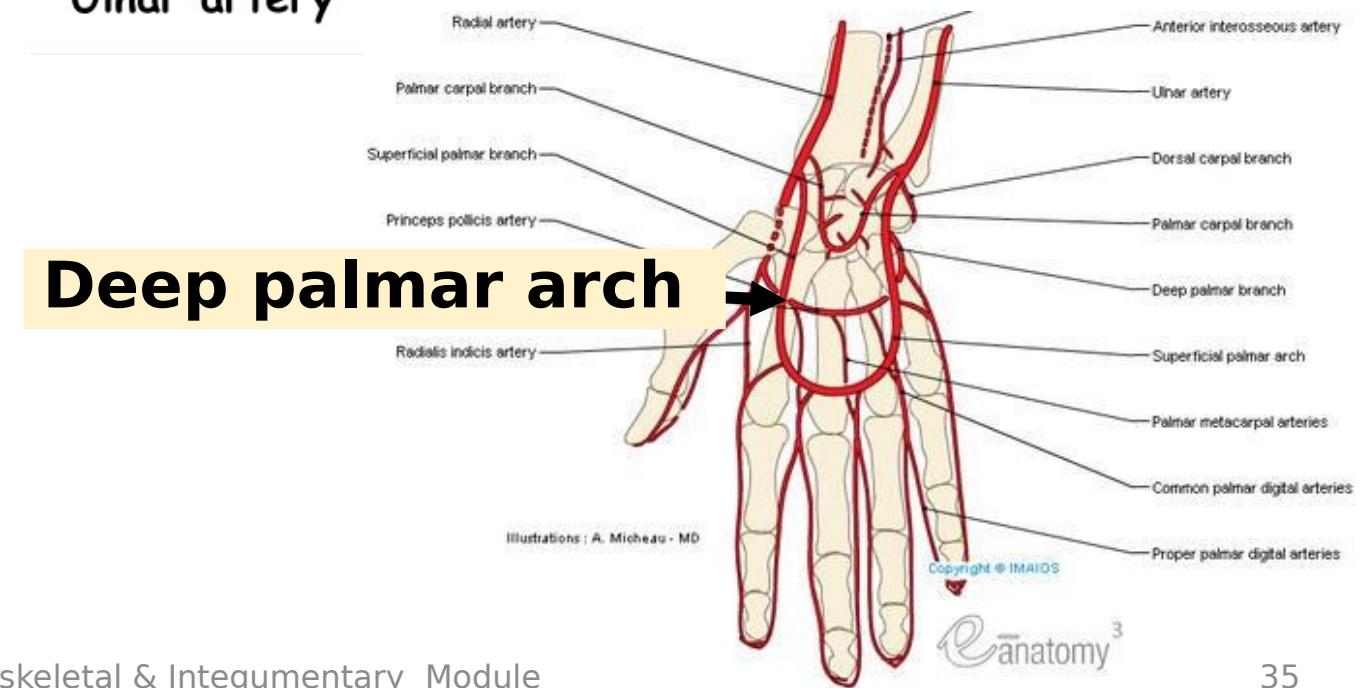
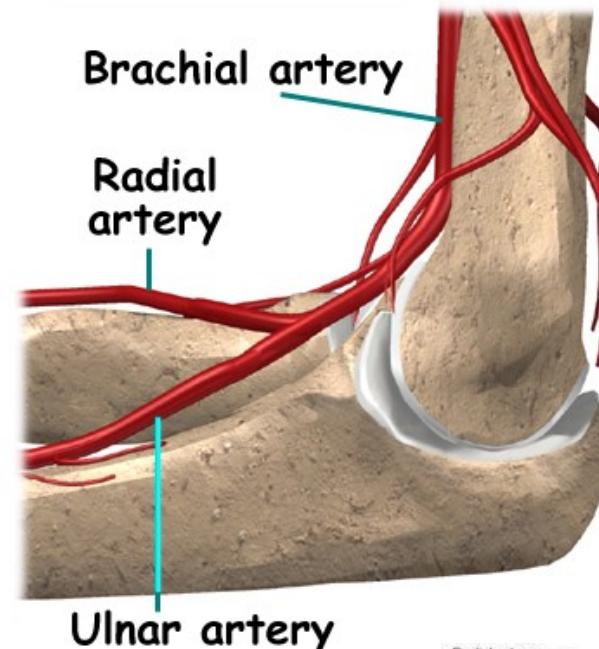
- a.Ulnar nerve**
- b.Radial nerve**
- c.Musculocutaneous nerve**
- d.Median nerve**
- e.Posterior interosseous nerve**



# RADIAL ARTERY

## BEGINNING OF RADIAL ARTERY:

- One of 2 terminal branches of brachial artery
- At level of neck of the radius in cubital fossa



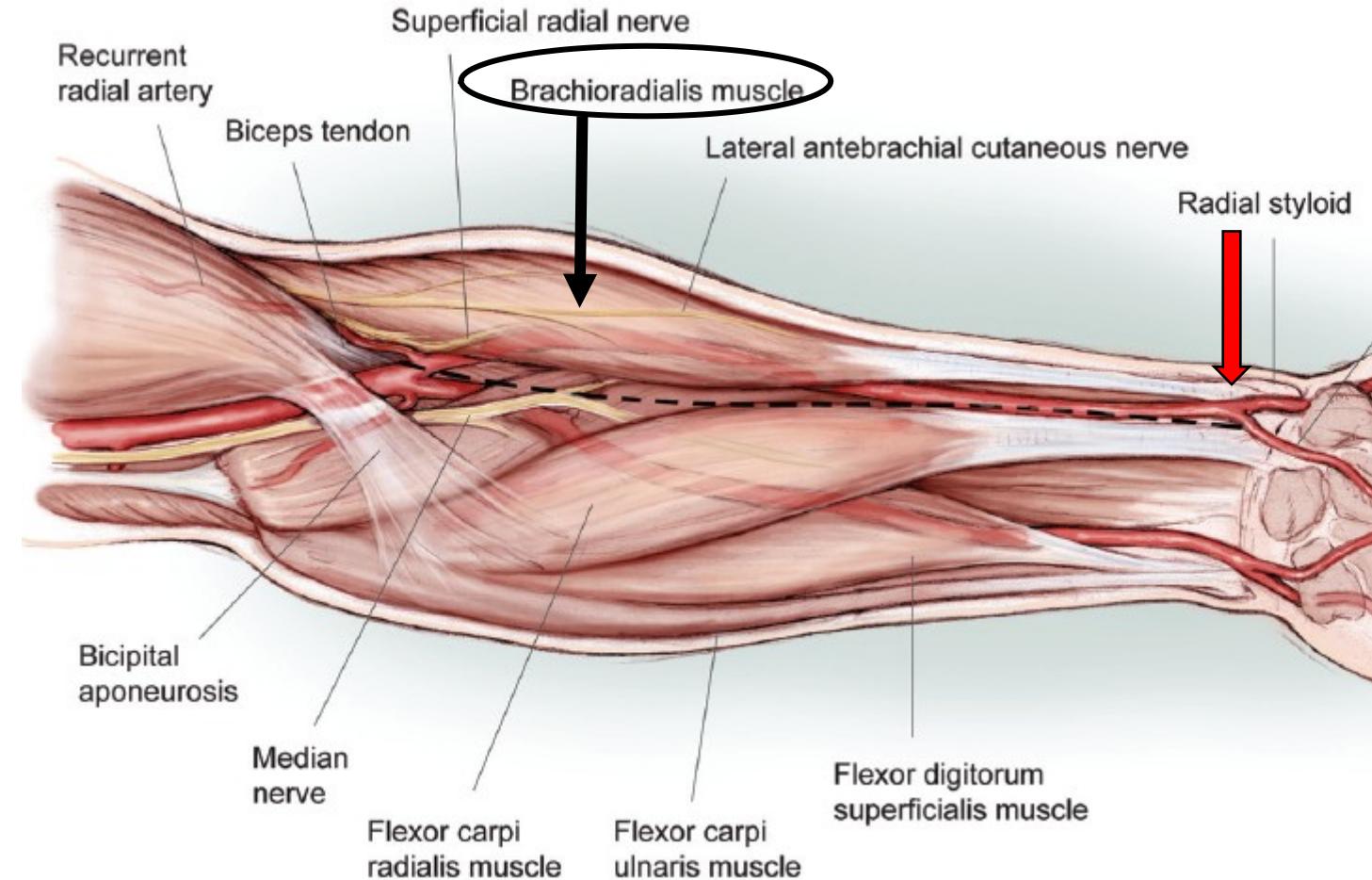
## END OF RADIAL ARTERY:

- Continues as

**Upper 2/3 of forearm: Covered by brachioradialis**

**Lower 1/3 of forearm:**  
**Subcutaneous and its pulsations can be felt**

**It then passes backwards to run in the floor of anatomical snuff box.**



[www.semanticscholar.org](http://www.semanticscholar.org)

Where can you feel the  
radial pulse?

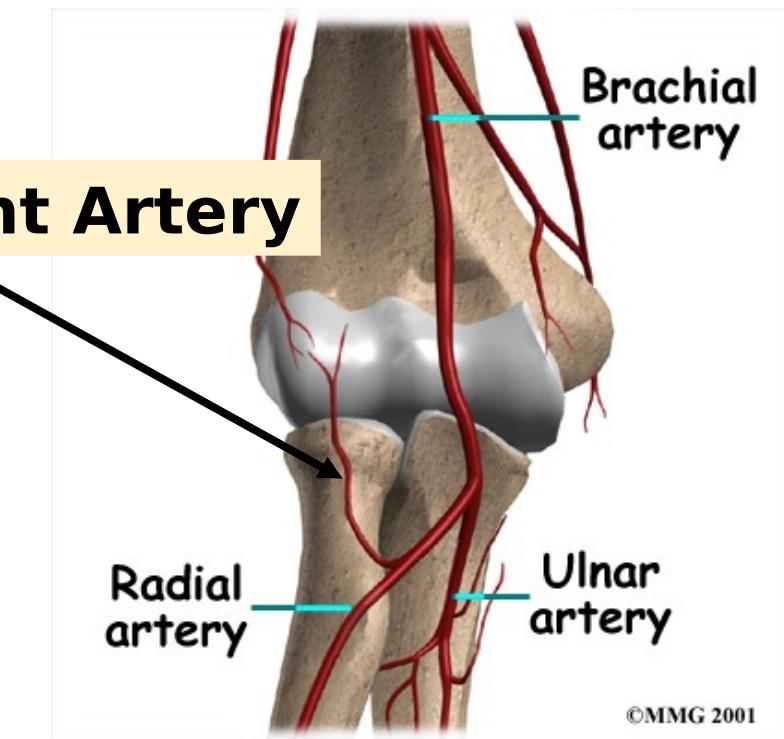
LATERAL TO  
THE  
TENDON OF  
FLEXOR  
CARPI  
RADIALIS



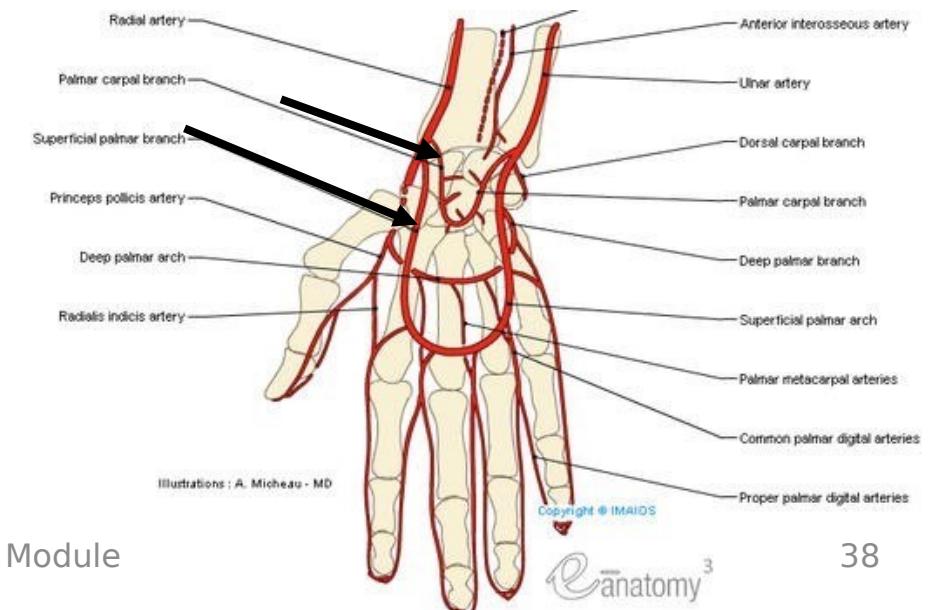
# Branches of radial artery in the forearm :

1. Radial Recurrent Artery
2. Muscular branches
3. Anterior (palmar) carpal
4. Superficial palmar artery which joins the

## Radial Recurrent Artery

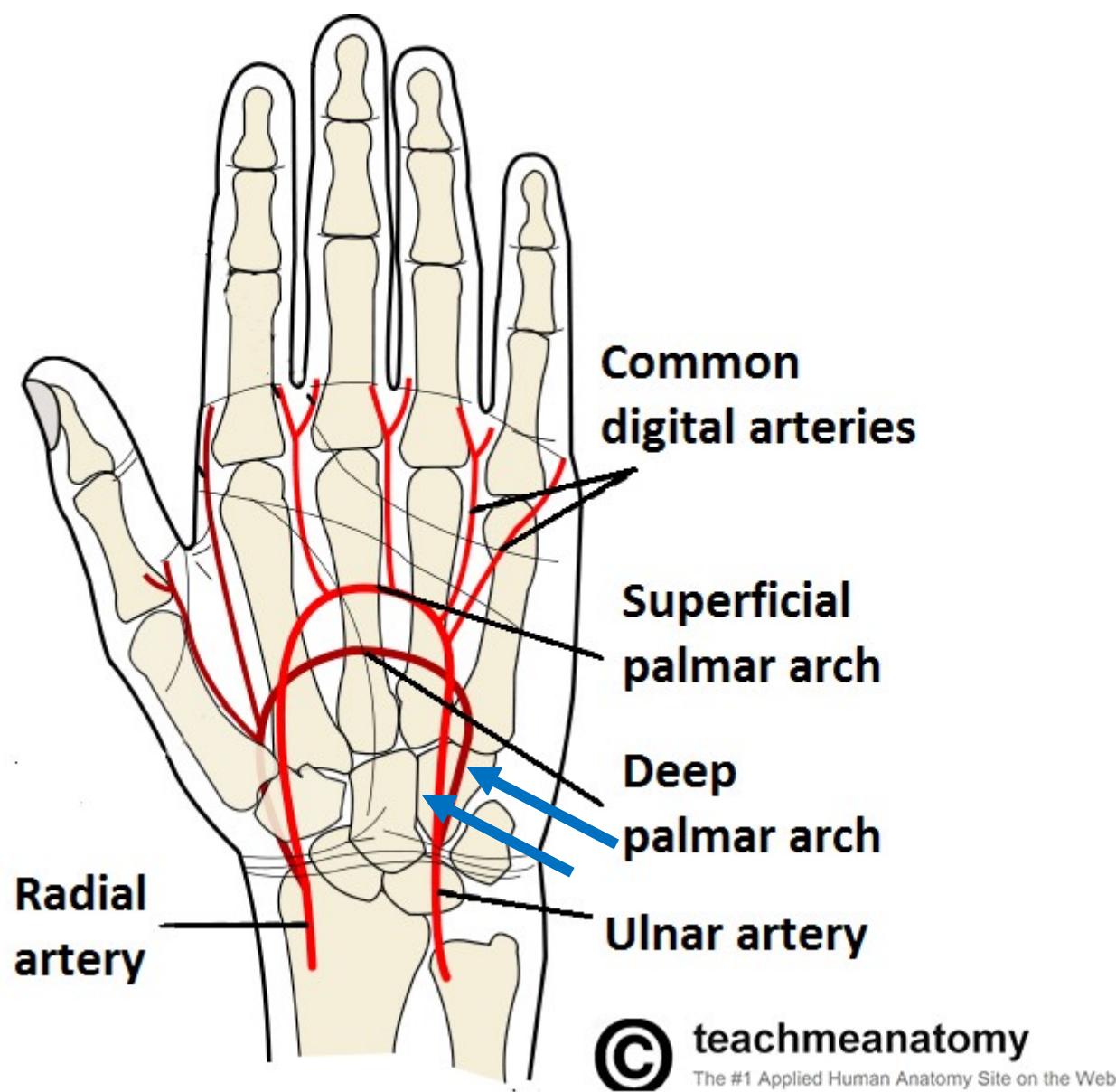


©MMG 2001



- **ULNAR ARTERY:**
- **BEGINNING OF ULNAR ARTERY:**
- **Larger terminal branch of brachial artery**
- **Opposite neck of radius**

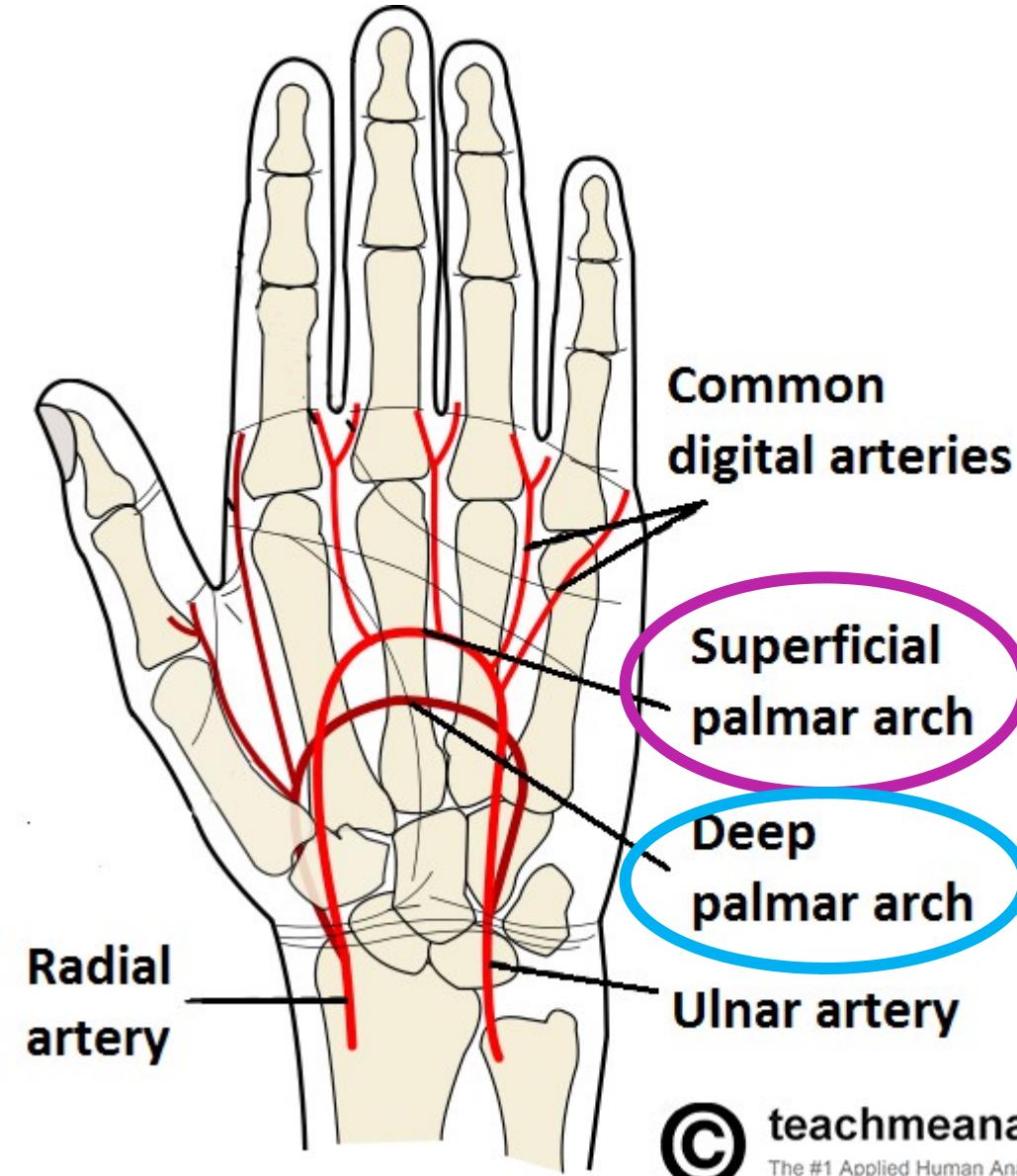
- **END OF ULNAR ARTERY:**
- **Passes superficial to the flexor retinaculum & lateral to pisiform bone.**
- **Divides into 2 terminal branches; superficial and deep. The superficial branch is the continuation of the ulnar artery which forms the superficial palmar arch.**



teachmeanatomy  
The #1 Applied Human Anatomy Site on the Web.

**Superficial branch**  
(continuation of  
ulnar artery) forms  
**superficial palmar  
arch** with superficial  
palmar branch of  
radial artery

**Deep branch:** joins  
end of radial artery  
to form **deep palmar  
arch**



# Branches of ulnar artery in the forearm :

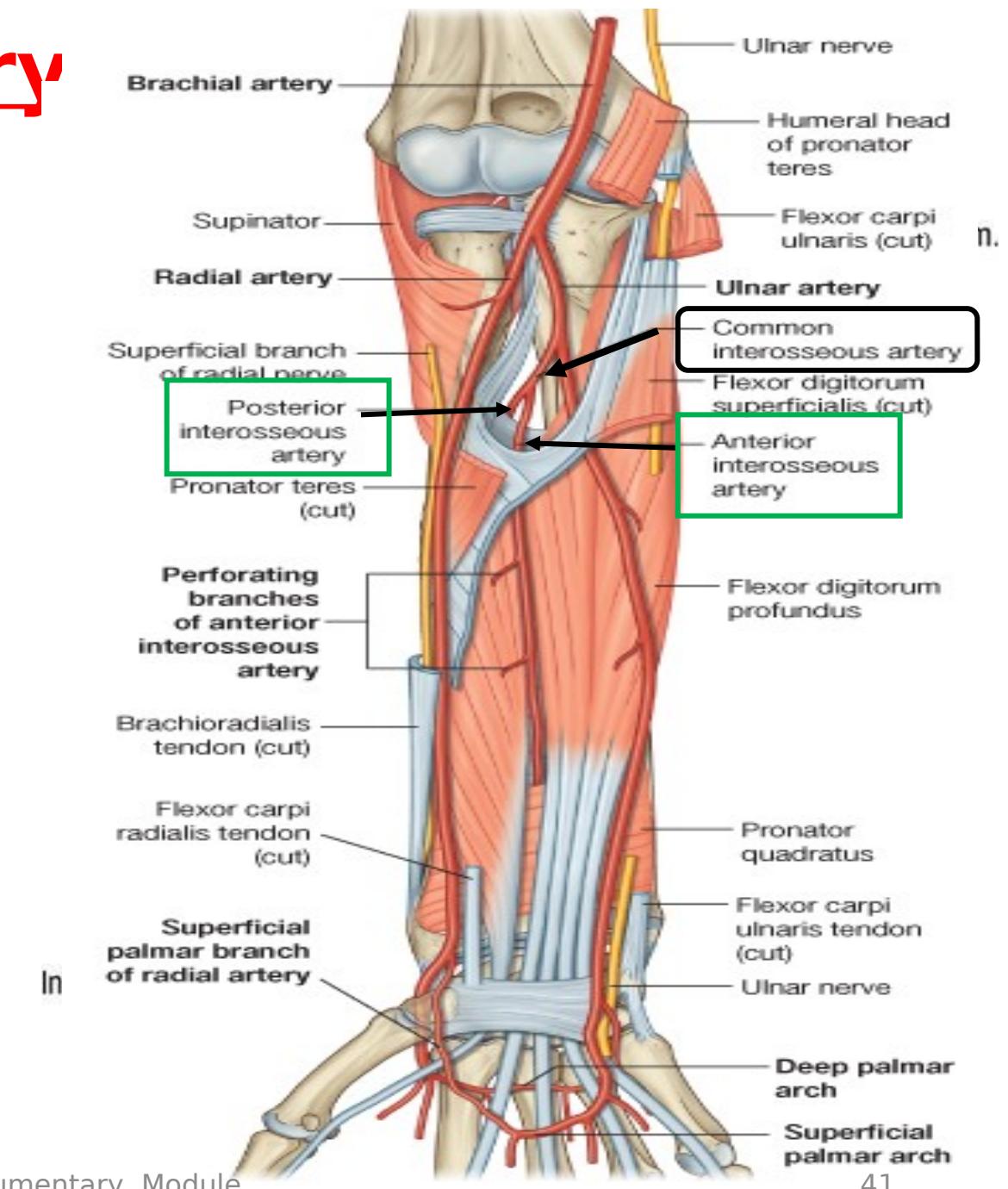
1) Anterior ulnar recurrent artery

2) Posterior ulnar recurrent artery

3) Common interosseous artery:

**Gives:**

- a. Anterior interosseous artery
- b. Posterior interosseous artery



A medical student is asked to feel the radial pulse. He should put his fingers in which of the following sites?

- A. Medial to biceps tendon
- B. Lateral to biceps tendon
- C. Medial to flexor carpi radialis tendon
- D. Lateral to flexor carpi radialis tendon
- E. In roof of anatomical stuff box



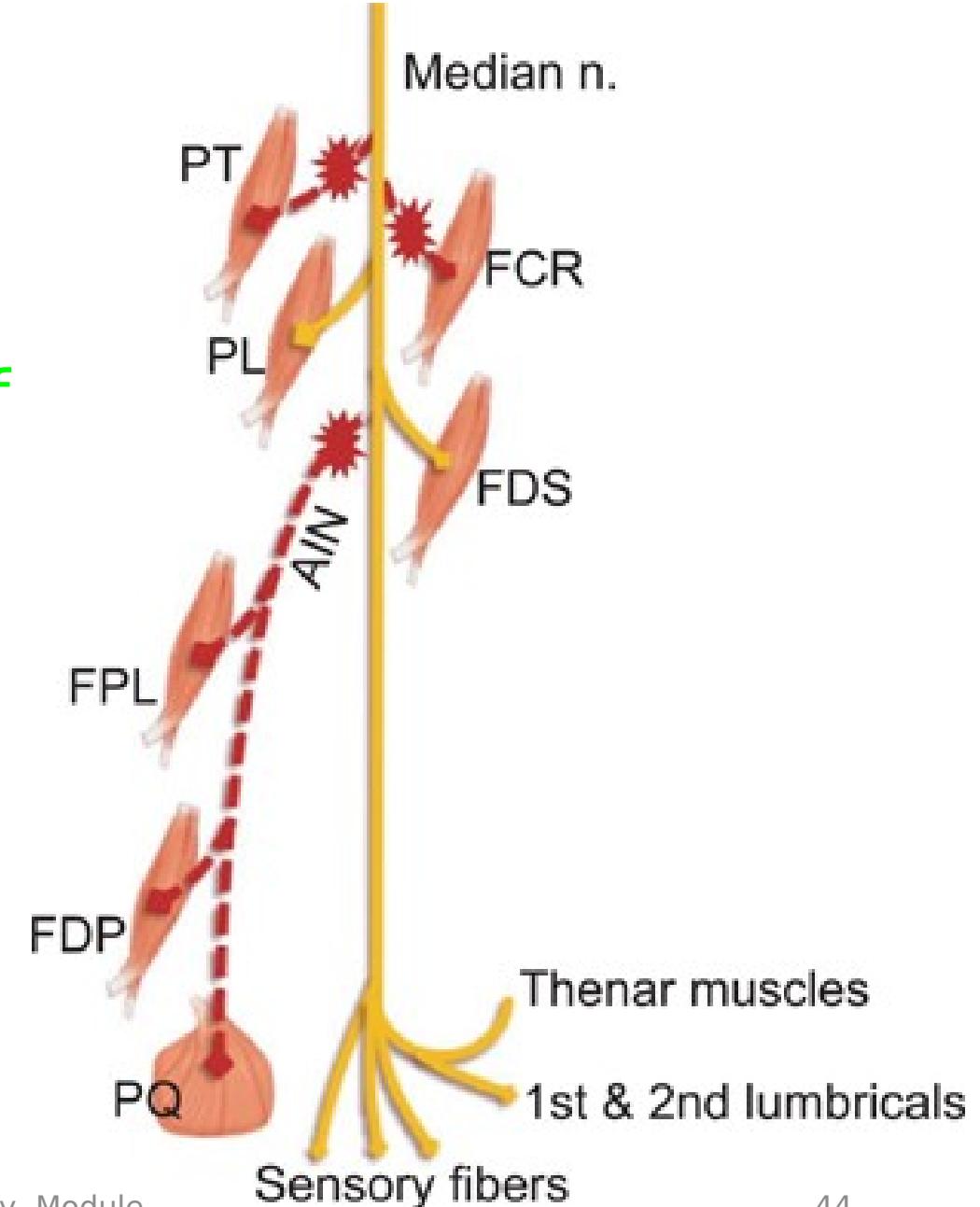
# Median nerve

- It is the main nerve of the flexors of the forearm ,its root value is **C5,6,7,8,T1.**
- It arises by two roots: **lateral root** from lateral cord and **medial root** from medial cord.
- The nerve enters the forearm by passing **between the two heads of pronator teres**
- Then the nerve is **deep to flexor digitorum superficialis** .

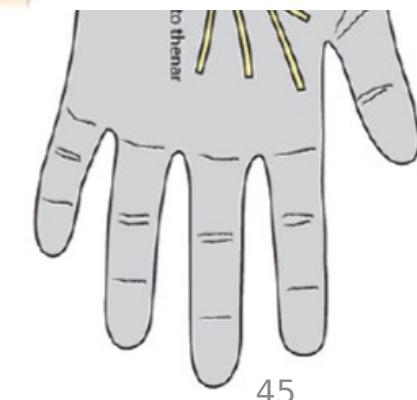
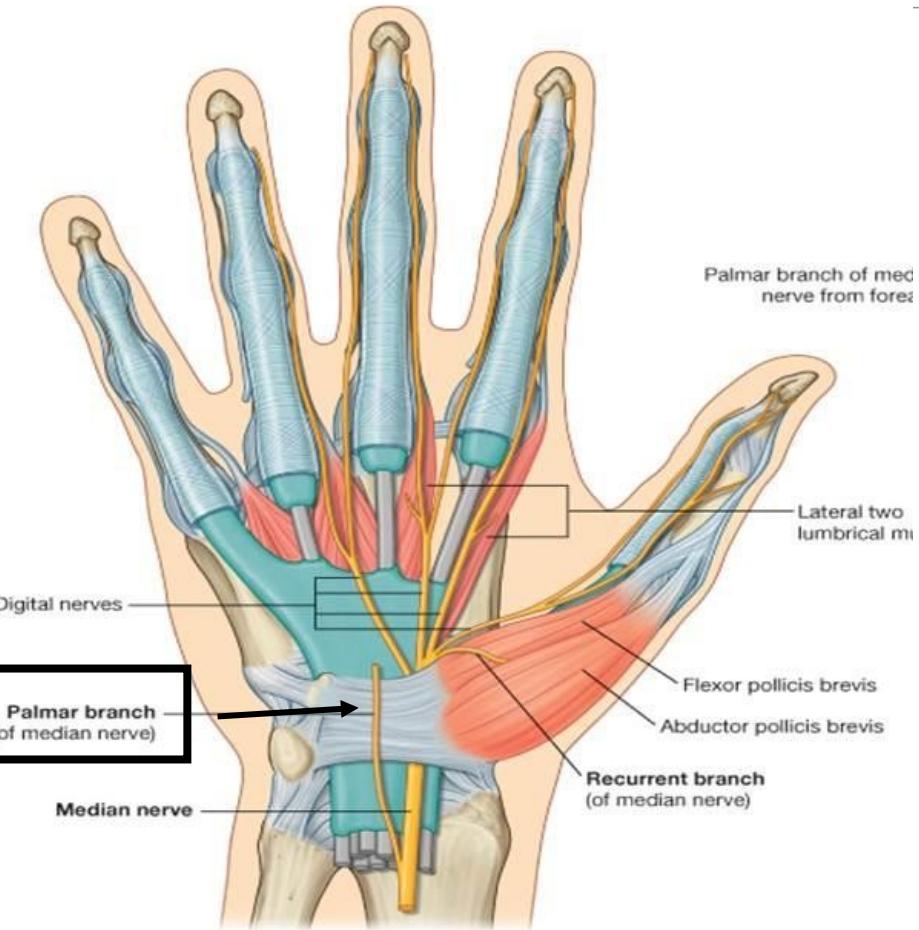
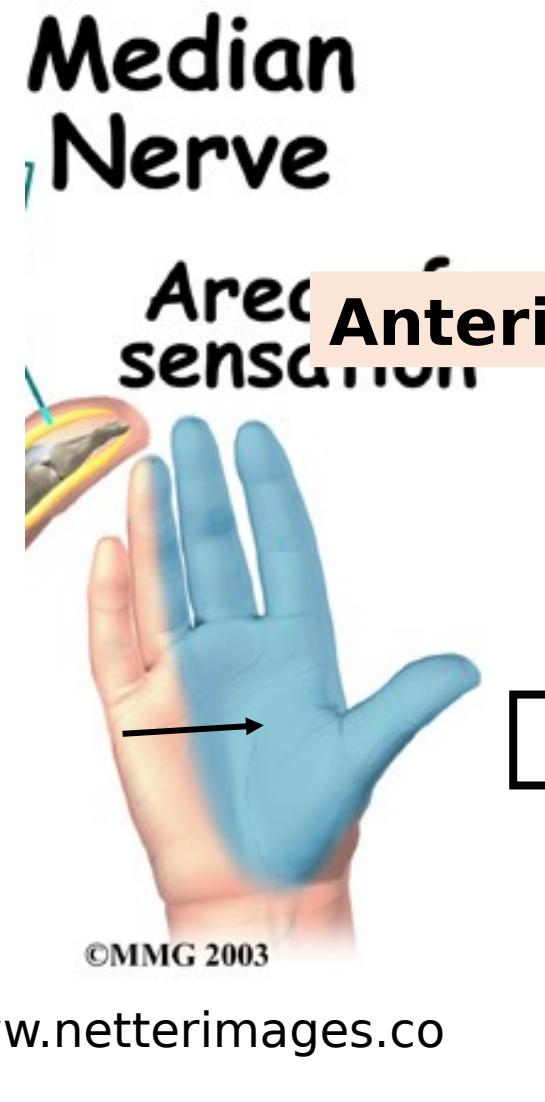


# Branches of Median nerve in the forearm:

- 1) Articular to the elbow & superior radioulnar joints
- 2) Muscular to all superficial flexors of forearm, **except** flexor carpi ulnaris (supplied by ulnar nerve)
- 3) Anterior interosseous to all deep flexors of forearm, **except** medial ½ of flexor digitorum profundus (supplied by ulnar nerve)
- 4) Palmar cutaneous branch passes superficial to flexor retinaculum to supply skin of lateral 2/3 of palm.



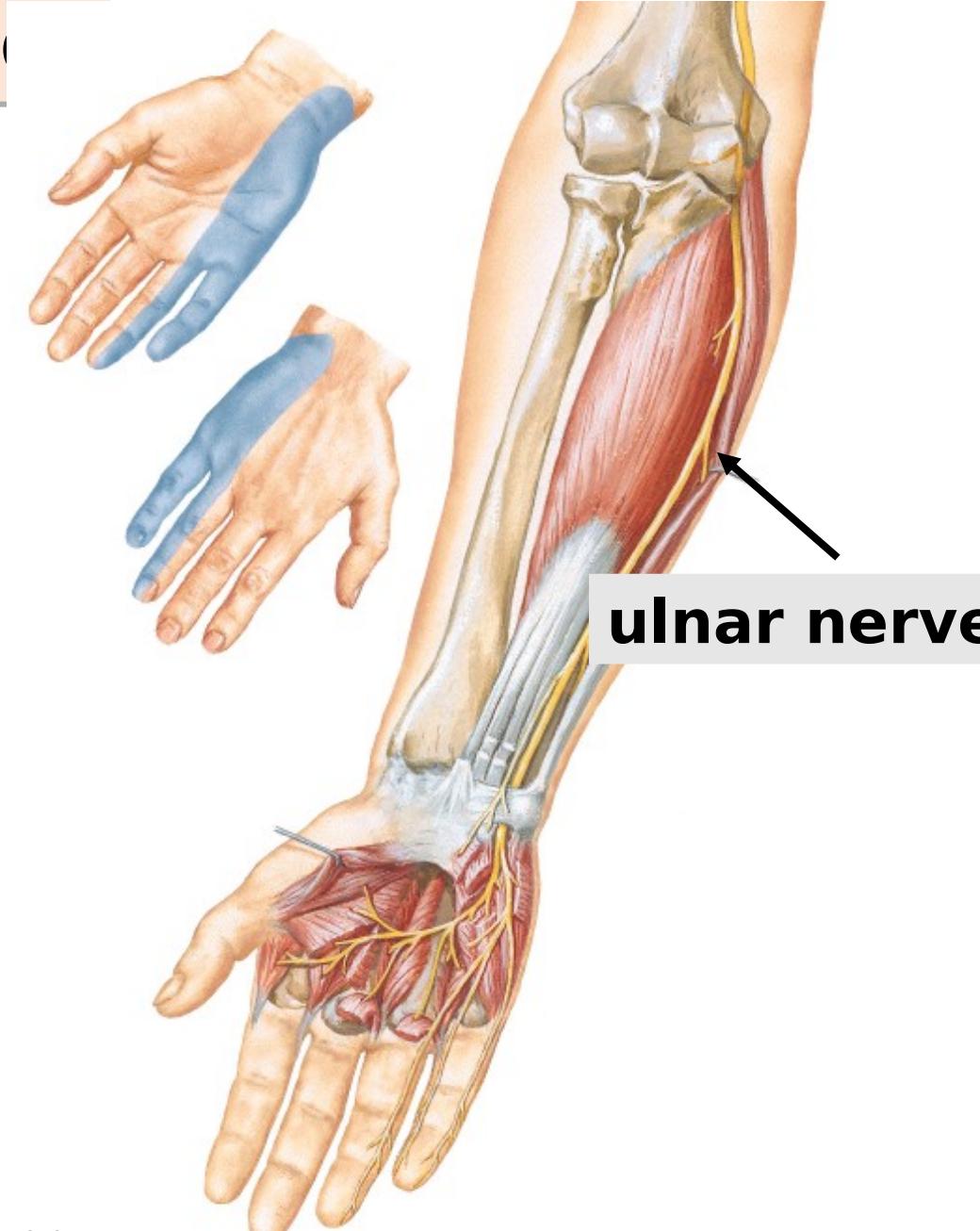
- The anterior interosseous nerve descend with the corresponding artery ,and it supplies the lateral  $\frac{1}{2}$  of the flexor digitorum profundus ,flexor pollicis longus and pronator quadratus .



- Palmar cutaneous

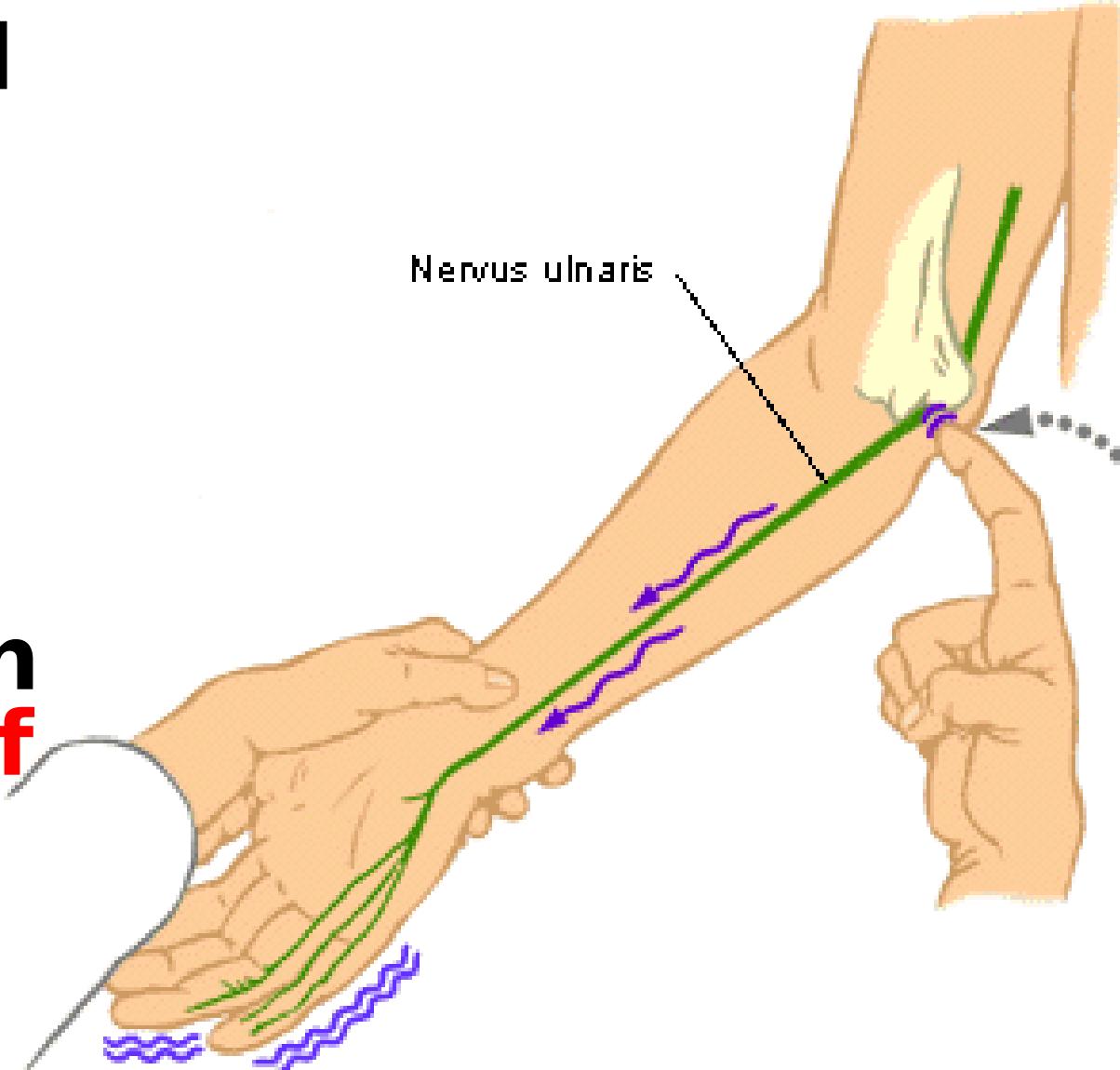
# The ulnar nerve

- It is the main nerve supplying most of the small muscles of the hand ,its root value is C7,8,T1.
- It arises from the medial cord of the brachial plexus .

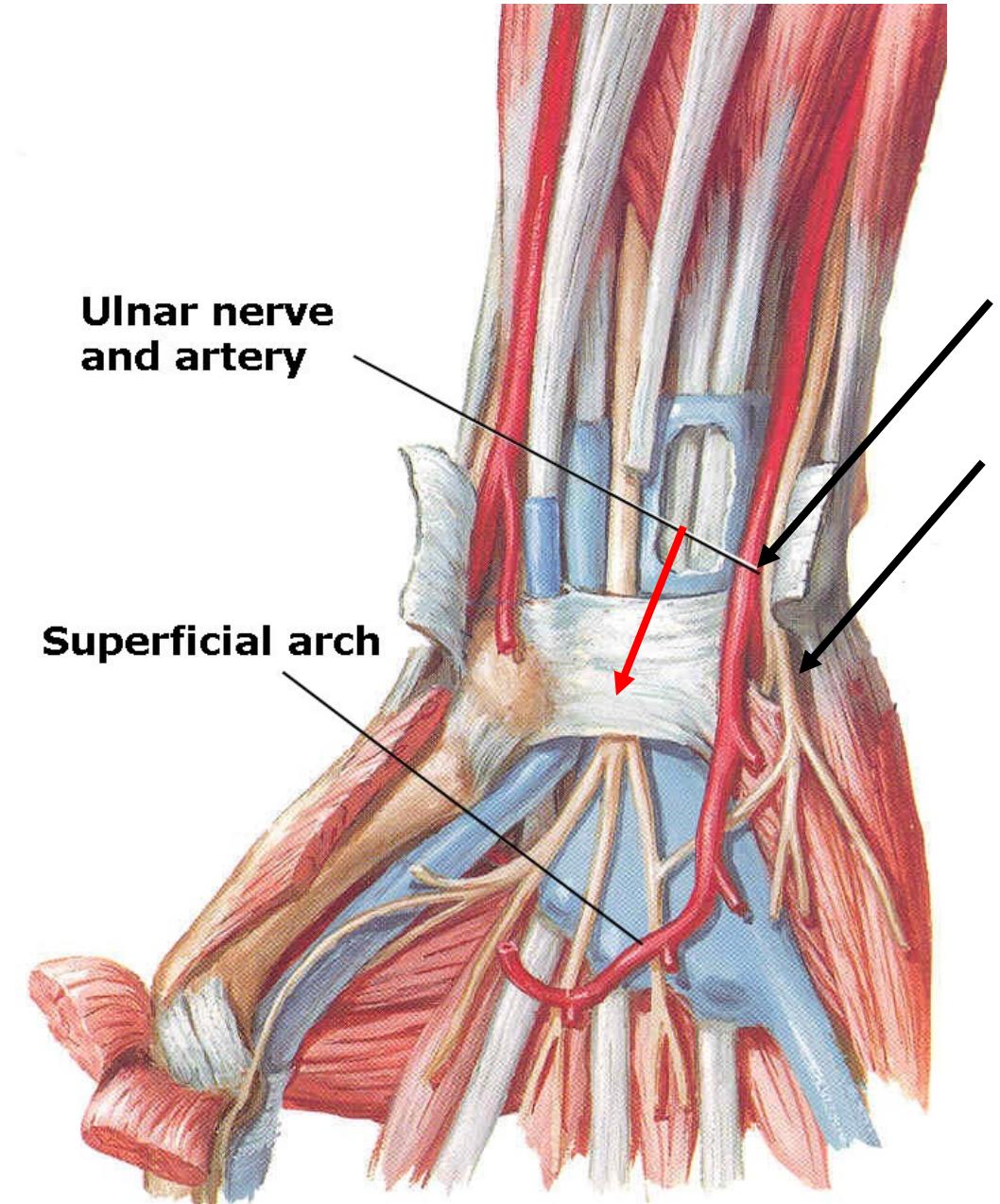


➤ It passes behind the medial epicondyle of humerus.

➤ It enters the forearm by passing between the **two heads of the flexor carpi ulnaris** .



- Near the wrist ,the ulnar nerve become superficial and pass **superficial to the flexor retinaculum** .
- It ends in the hand by dividing into superficial and deep branches.

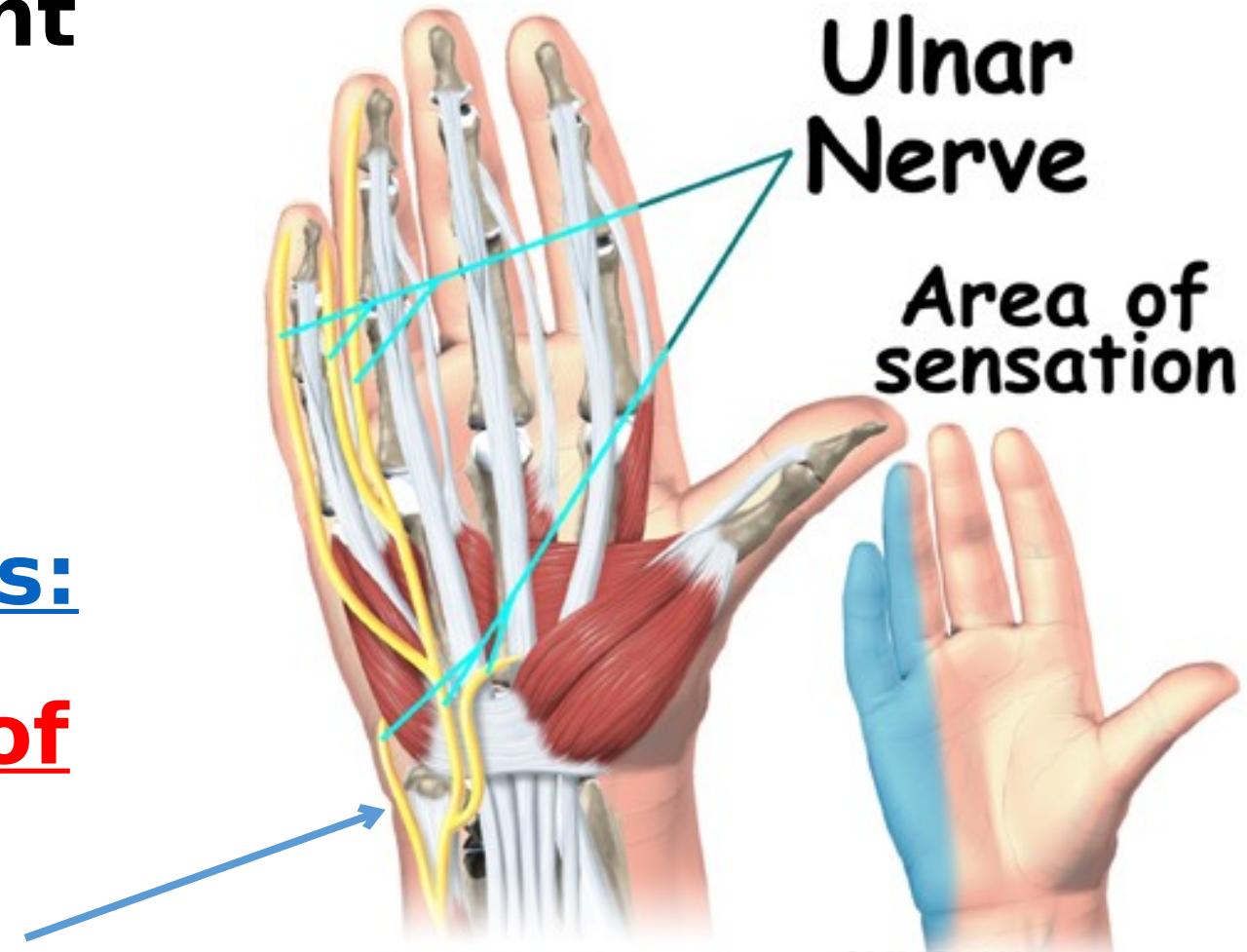


# Branches of Ulnar nerve in the forearm: Articular brs □ elbow joint

**Muscular branches** to flexor carpi ulnaris and medial  $\frac{1}{2}$  of the flexor digitorum profundus.

Two cutaneous branches:  
**Palmar cutaneous br □**  
medial 1/3 of the palm of the hand

**Dorsal cutaneous br □**  
medial 1/3 of the dorsum of the hand and dorsum of the medial one and half



/  
©MMG 2003  
www.netterimages.com

Radiology of the upper limb of a patient showed fractured medial epicondyle. Which of the following nerves is likely to be affected?

- A. Median
- B. Ulnar
- C. Radial
- D. Posterior interosseous
- E. Anterior interosseous



# SUGGESTED TEXTBOOKS



Gray's Anatomy for students. [www.studentconsult.com](http://www.studentconsult.com)